Section: Dermatology Venereology and Leprosy

Original Research Article

DERMATOLOGICAL MANIFESTATIONS IN TYPE 2 DIABETES MELLITUS

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ABSTRACT

Background: Diabetes mellitus is a prevalent global health issue, affecting over 536 million people worldwide and showing a rising trend. This endocrine disorder can lead to a range of health complications, including various skin manifestations. Dermatological conditions associated with diabetes are often crucial for early diagnosis and management. This study aims to assess the prevalence and types of dermatological manifestations in patients with Type 2 diabetes mellitus and to compare these findings with existing literature.

Materials and Methods: A prospective study was conducted with 250 patients aged 18 years and above, diagnosed with Type 2 diabetes mellitus, who presented with dermatological manifestations at the Index Medical College Hospital and Research Centre, Indore. Detailed histories, physical examinations, and dermatological assessments were performed. Blood tests, including CBC, RBS, FBS, PPBS, HbA1C, serum creatinine, and TSH, were conducted. Data were analyzed using IBM SPSS Statistics version 23.

Results: The prevalence of dermatological manifestations among the study participants was 56%, with a male-to-female ratio of 1.27:1. The most common manifestations included infections (35.2%), pruritus (10.8%), xerosis (8.4%), acrochordons (8%), stasis dermatitis (7.6%), vitiligo (5.2%), acanthosis nigricans (4.8%), and perforating dermatosis (4.0%). Among infections, tinea infections were the most frequent (48.8%), followed by intertrigo (20.5%) and folliculitis (11.4%). The majority of patients (46%) had diabetes for 6 to 10 years, and 55% were on oral anti-diabetic drugs, while 38% were on insulin.

Conclusion: Dermatological manifestations are prevalent in Type 2 diabetes mellitus and can serve as early indicators of disease progression. Effective management requires timely identification and treatment of these conditions to prevent complications and enhance quality of life for diabetic patients.

Keywords: Type 2 DM, Dermatological Manifestations, Pruritus, Acanthosis Nigricans, Dermatological Conditions, Glycemic Control.

INTRODUCTION

Diabetes mellitus is a significant global health issue, affecting over half a billion people and more than 10.5% of adults worldwide. Its prevalence is expected to rise, potentially reaching 12.2% by 2045. Diabetes leads to a variety of health complications, including numerous skin manifestations, which can be crucial in early detection and management. Dermatologists play a key role in identifying these conditions, which may often precede the diabetes diagnosis.[1,2]

Diabetes mellitus is characterized by chronic hyperglycemia and disruptions in protein, carbohydrate, and fat metabolism due to impaired insulin action or secretion. Between 30% and 70% of diabetic patients develop skin complications at some point.[1-4] These skin manifestations range from cosmetic issues to severe health concerns.[1,3]

In 2021, approximately 536.6 million people aged 20-79 had diabetes, with prevalence higher in urban (12.1%) and high-income areas compared to rural (8.3%) and low-income regions.[2,4] The relationship

between diabetes and skin disorders can be categorized into several types:

1. Skin Conditions Strongly Associated with Diabetes:

- Acanthosis Nigricans: Common in type 2 diabetes, presenting as dark, thickened skin in folds. It is associated with insulin resistance and can occur in other endocrine disorders and malignancies like gastric cancer. Treatment involves weight loss, glycemic control, and topical agents.[5]
- Diabetic Foot: Characterized by callosities, xerosis, and ulcers, it arises from neuropathy, atherosclerosis, and poor healing. Management includes hygiene, proper footwear, antibiotics for infections, and possible surgical revascularization.[6]
- Necrobiosis Lipoidica: A rare condition mainly in women, presenting as erythematous papules and plaques with a yellow-brown center, commonly on the shins. It is associated with both diabetes types and has various treatment options including corticosteroids and other topical therapies.[7]
- Diabetic Bullae (Bullosis Diabeticorum): Painless, spontaneously occurring bullae that heal without scarring but require prevention of infection.[8]

2. Non-Specific Signs and Symptoms:

- Acrochordons: Soft, pedunculated growths often associated with insulin resistance, located in areas like the axilla or neck. Treatment is typically cosmetic.[9]
- Eruptive Xanthomas: Reddish-yellow papules linked to high triglyceride levels, treated through lipid control and occasionally excision or laser therapy.[10]
- Skin Itching: Often due to xerosis and can be managed with glucose control and topical treatments.
- Rubeosis Faciei: Facial redness indicating poor glycemic control and impaired microcirculation. Treatment focuses on glycemic management.[10]

3. Other Dermatological Conditions:

- Granuloma Annulare: Characterized by erythematous papules and plaques, associated with diabetes and various comorbidities. Treatment may include corticosteroids and other therapies.[11]
- Lichen Planus: A condition affecting about 25% of diabetic patients, presenting as pruritic, polygonal papules. Management includes corticosteroids and other systemic treatments.
- Other Conditions: Vitiligo, psoriasis, and hidradenitis suppurativa have also been reported in diabetic patients.[1,12,13]

4. Common Skin Infections:

- Diabetes increases susceptibility to infections such as bacterial (e.g., Staphylococcus aureus) and fungal (e.g., Candida infections) due to altered skin pH, vascular changes, and neuropathy. These infections can complicate wound healing.[14]

5. Skin Complications from Antidiabetic Therapy:

- Insulin Therapy: Common reactions include lipohypertrophy, lipoatrophy, and allergic responses. Oral medications can cause various skin reactions, including drug eruptions and photosensitivity. Metformin and other antidiabetics may also lead to skin conditions like leukocytoclastic vasculitis or psoriatic eruptions[14]

Overall, effective management of diabetes-related skin conditions requires a combination of good glycemic control, appropriate treatment for skin manifestations, and vigilance for potential infections. Thus, the present study is significant in view of the increasing prevalence of Type 2 diabetes mellitus and aimed to assess and determine the prevalence of various dermatological manifestations associated with Type 2 diabetes mellitus and to compare these findings with existing literature.

MATERIALS AND METHODS

After approval from institutional ethical committee, the present prospective study was conducted on 250 patients aged 18 years and above of either sex; with newly or previously diagnosed Type 2 Diabetes mellitus presenting with dermatological manifestations and visiting the Out Patient Department of Dermatology and Emergency Medicine at Index Medical College Hospital and Research Centre, Indore. All patients satisfying the inclusion criteria were enrolled after obtaining a written informed consent.

Inclusion Criteria

- Patients aged more than 18 years of either sex;
- All patients with type 2 diabetes mellitus (DM) who were either newly diagnosed or had a previous diagnosis; and
- Patients who consented for the study.

Exclusion Criteria

- Patients aged less than 18 years;
- Pregnant Patients with gestational diabetes;
- Lactating Mothers;
- Patients of Type 2 DM with preexisting renal disease, stroke and endocrinopathies; and
- Non-consenting patients

Methodology

A convenient sampling technique was used. Detailed histories were obtained from the patients, including information on dermatological manifestations, the duration and type of diabetes mellitus, and drug history. A thorough physical examination was conducted, with particular attention to dermatological aspects, including assessments of the hair, skin, nape of the neck, nails, shin of the tibia, and inguinal region. A dermatologist performed the dermatological examination. Blood investigations were carried out, including CBC, RBS, FBS, PPBS, HbA1C, serum creatinine, blood urea, and TSH (with T3 and T4 if needed). Histopathological examinations were also conducted by dermatologist

to give diagnosis wherever required. Additionally, demographic data was collected to provide a comprehensive overview of each patient's condition. The data was prospectively and systematically collected in a predesigned proforma.

Statistical Analysis

Data analysis was performed using IBM SPSS Statistics version 23 for Windows (SPSS Inc; IBM, Chicago, IL, USA). Descriptive statistics such as mean, percentages, standard deviation and ranges were found out. For univariate comparisons, categorical variables were evaluated using Chi-square or Fisher's exact tests. Continuous variables were analyzed with Student's t- test or the Mann–Whitney test, as appropriate. All statistical tests were two-tailed, with P values <0.05 considered statistically significant.

RESULTS

Among a total of 250 Type 2 diabetes mellitus subjects, the prevalence of dermatological manifestations was 56 % and 44 % in males and females respectively, male to female ratio is 1.27: 1. [Figure 1] Dermatological manifestations were more common in age group of 41 to 50 years with mean age being 44.20 + 11.42 years. [Figure 2]

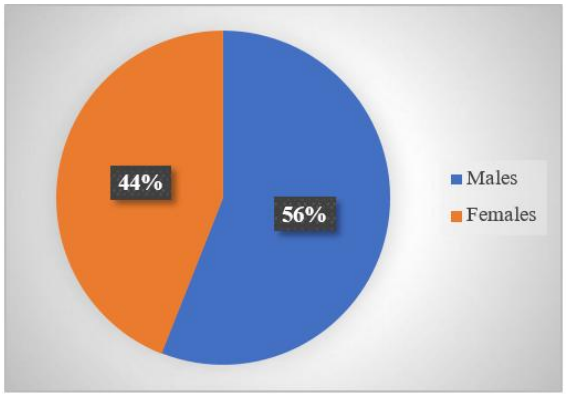

Figure 1. Distribution of study population depending upon gender

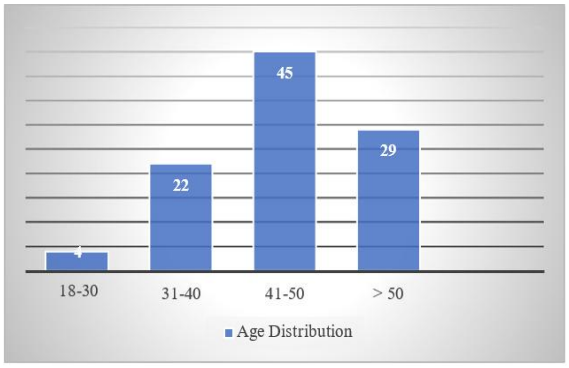

Figure 2. Distribution of study population depending upon age

Infections (35.2 %) were the most common dermatological manifestation followed by pruritus (10.8 %), xerosis (8.4%), acrochordons (8%), stasis dermatitis (7.6%), vitiligo (5.2%), acanthosis nigricans (4.8%), perforating dermatosis (4.0%) and others [Table 1]. Among infections, tinea infections (48.8 %) were most common followed by intertrigo (20.5%), folliculitis (11.4%), cellulitis (7.9%), vulvo-vaginal candidiasis (5.7%), balanoposthitis (3.4%) and herpes zoster (2.3 %) [Table 2, Figure 3].

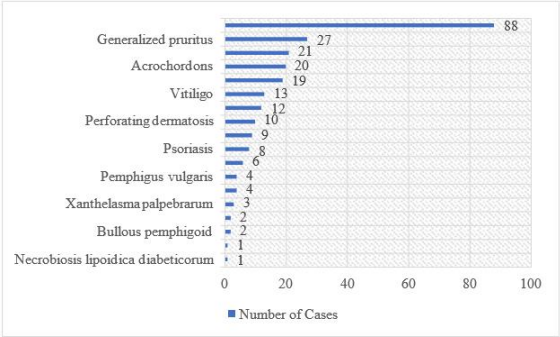

Figure 3. Dermatological Manifestations in Study population

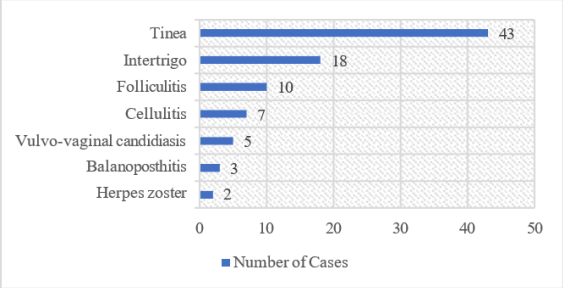

Figure 4. Dermatological Manifestations Related to Infections in Studied Type 2 Diabetes mellitus Patients

In 46% of the patients, duration of diabetes was 6 to 10 years. A statistically non-significant correlation was observed between Skin lesions and the duration of Type 2 DM (P>0.05). For HbA1C levels, 173 (69.20%) patients had HbA1C level was > 7. A statistically non-significant association was observed between HbA1C levels and Skin lesions except for bacterial infections. In the present study, 55 % of the patients were on oral antidiabetic drugs, 38 % on insulin and remaining 7 % were not on treatment.

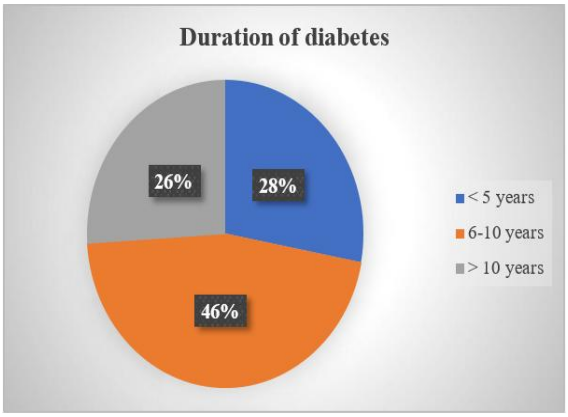

Figure 5. Distribution of study population depending upon age

Table 1: Dermatological Manifestations in Study population.

Dermatological Manifestations	Number of Cases	Percentage (%)
Necrobiosis lipoidica diabeticorum	1	0.4
Pyoderma gangrenosum	1	0.4
Bullous pemphigoid	2	0.8
Granuloma annulare	2	0.8
Xanthelasma palpebrarum	3	1.2
Diabetic foot ulcer	4	1.6
Pemphigus vulgaris	4	1.6
Diabetic bullae	6	2.4
Psoriasis	8	3.2
Lichen planus	9	3.6
Perforating dermatosis	10	4.0
Acanthosis nigricans	12	4.8
Vitiligo	13	5.2
Stasis dermatitis	19	7.6
Acrochordons	20	8
Xerosis	21	8.4
Generalized pruritus	27	10.8
Infections	88	35.2
Total	250	100

Table 2: Dermatological Manifestations Related to Infections in Studied Type 2 Diabetes mellitus Patients

Infections	Number of Cases	Percentage (%)
Herpes zoster	2	2.3
Balanoposthitis	3	3.4
Vulvo-vaginal candidiasis	5	5.7
Cellulitis	7	7.9
Folliculitis	10	11.4
Intertrigo	18	20.5
Tinea	43	48.8
Total	88	100

DISCUSSION

Diabetes mellitus is a widespread endocrine disorder with diverse clinical manifestations across various medical specialties. While no skin diseases are exclusive to diabetes, certain conditions are more prevalent among diabetics compared to non-diabetics.

In this study, 74% of patients with Type 2 diabetes mellitus and dermatological manifestations were aged 41 years or older, with an average age of 44.20 ± 11.42 years. This finding aligns with observations by Anand LC et al,[15] (74%) and Kadam MN et al,[16] (81%). The study also found a higher prevalence of Type 2 diabetes in males (56%) compared to females (44%), with a male-to-female ratio of 1.27:1, consistent with George T et al,[17] (62% males and 38% females).

Regarding disease duration, 46% of patients had Type 2 diabetes mellitus for 6 to 10 years. Treatment patterns revealed that 55% of patients were on oral anti-diabetic medications, 38% were using insulin, and 7% were not receiving treatment. These results are comparable to those reported by Azizian Z et al,[18] who found that 69.3% of patients were on oral medications, 26.2% were on insulin, and 4.4% were untreated.

In this study, the dermatological manifestations of Type 2 diabetes mellitus included infections (35.2%), pruritus (10.8%), xerosis (8.4%), acrochordons (8%), stasis dermatitis (7.6%), vitiligo (5.2%), acanthosis nigricans (4.8%), perforating dermatosis (4%), and other conditions. These findings are consistent with those reported by Yadav S et al,[19] Generalized pruritus should be thoroughly evaluated, as it may be associated with other medical conditions such as hypothyroidism, uremia, jaundice, lymphoma, leukemia, and internal malignancies. Demis et al. reported a 3% incidence of generalized pruritus in diabetes mellitus, while Kadam MN et al,[17] observed 17% of patients with generalized pruritus. Anand LC et al,[15] noted that unexplained pruritus, whether generalized or localized, could be an early indicator of diabetes, with 40% of diabetics experiencing pruritus of unknown origin. In this study, generalized pruritus was observed in 11% of patients, which is lower compared to the rates found by Kadam MN et al,[17] and Anand LC et al.[15]

Among infections, tinea infections were the most prevalent dermatological condition in the present study, affecting 48.8% of patients, followed by intertrigo (20.5%), folliculitis (11.4%), cellulitis (7.9%), vulvo-vaginal candidiasis (5.7%), balanoposthitis (3.4%), and herpes zoster (2.3%). This pattern of high fungal infection rates is consistent with the findings of George T et al,[17] who reported a 44% incidence of fungal infections, as well as with Anand LC et al,[15] (35%) and Kadam MN et al,[16] (38%). Poorly controlled diabetes significantly increases the risk of developing infections. Additionally, acrochordons were found in 8% of patients in this study. These skin tags are associated with impaired carbohydrate metabolism and may help identify individuals at risk for diabetes mellitus. This association is supported by theoretical considerations related to insulin's effect on fibroblast

growth factors. Khana M et al,[20] observed skin tags in 26.3% of patients with overt diabetes or impaired glucose tolerance, while Huntley AC et al,[21] also found a correlation between multiple, large, hyper-pigmented tags and diabetes.

Study limitations include small or biased samples, methodological issues, and uncontrolled confounding variables. Additionally, short study durations, external validity concerns, and researcher bias can impact the reliability and generalizability of the findings.

CONCLUSION

Type 2 Diabetes mellitus, a prevalent endocrine disorder, impacts nearly all medical specialties through its diverse clinical manifestations. Skin changes are particularly significant, with approximately one-third of diabetic patients experiencing dermatological manifestations. These skin changes are crucial as they can often serve as early indicators of the disease's onset or progression. Timely identification and management of common skin issues, such as extensive tinea corporis, pruritus, psoriasis, lichen planus, macro and microangiopathies, and trophic ulcers, are essential. Addressing these manifestations promptly can help prevent complications and improve patients' quality of life.

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